REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested. Claims 1-38 are in this case. Claims 1-27 have been rejected. Claims 28-38 have been canceled without prejudice, in response to the withdrawal of these claims from further consideration by the Examiner as being drawn to a non-elected invention. New claims 39-44 have been added. A new Abstract has been added.

OBJECTIONS TO THE SPECIFICATION

The Examiner has objected to the specification as lacking an Abstract. Applicant has enclosed an Abstract, on a separate sheet, as requested by the Examiner. Applicant feels that these changes and additions overcome the Examiner's rejections in this regard.

Rejections over 35 USC 112

The Examiner has rejected claims 3-5 over 35 USC 112, second paragraph, as being unclear. While continuing to traverse the rejections of the Examiner, Applicant has chosen to amend claims 3 and 4 to overcome the rejections of the Examiner and to advance the prosecution. Amended claims 3 and 4 now recite "said texture mapping *data*" (emphasis indicates added word) to overcome these rejections. Applicant feels that the addition of the word "data" sufficiently clarifies these claims.

Rejections over 35 USC 102(a)

The Examiner has rejected claims 1-6 under 35 USC 102(a) as being unpatentable over US Patent No. 5,769,640 to Jacobus et al. (Jacobus). The rejections of the Examiner are respectfully traversed.

The object of Jacobus is a simulated medical procedure which is produced by actually copying a real medical procedure. In other words, Jacobus does not teach a true simulation, but rather a complete imitation of the procedure itself. Jacobus teaches recording and playing back all possible positions/images/forces which apply during the procedure. For example, Jacobus requires all of the images which are to be used during the procedure to have been prerecorded and then played back. Similarly, forces which are used must be taken from an actual medical procedure and then exactly reproduced. This exact reproduction is described in col 4, lines 35-38. Jacobus mentions interpolating or "morphing" between prerecorded images, but again does not teach the creation of new images. Such "morphing" merely allows for two images that were collected in separate sessions to be interpolated, but does not otherwise alter the actual images (see col 5, lines 24-28). Jacobus does not teach or suggest creating a three-dimensional model for modeling the organ for the medical procedure.

By contrast, the object of the present invention is a system for simulating a medical procedure performed on a subject, featuring a simulated organ, a simulated medical instrument and a locator for determining the

location of the instrument in the organ. The system further features a visual display for displaying images from the medical procedure. The visual display also includes a three-dimensional mathematical model for modeling the organ, which is divided into a plurality of linear segments. The location of the instrument in the organ is used to select the segment, which in turn is used to render the images for display on the visual display. The present invention also supports the addition of texture mapping, as recited in claims 3 and 4, which allow the *de novo* creation of images to be displayed.

Therefore, there are a number of important differences between the teachings of Jacobus and that of the present invention. First, the present invention teaches the use of a three-dimensional mathematical model for modeling the organ. The use of a three-dimensional mathematical model is important, as it supports an accurately rendered visual display of the simulated organ to the user, while also increasing the speed with which images are displayed to the user. By contrast, Jacobus does not teach the use of any such model. The portion of Jacobus recited by the Examiner as teaching such a model is in fact only concerned with the structure of two-dimensional images to be displayed, and does not teach or suggest the use of a model for modeling the organ for the medical procedure (see col. 5, lines 20-28 of Jacobus).

Second, the present invention includes the segmentation of the model into linear segments. This feature is particularly important, because it enables images to be rapidly selected for display. For example, optionally those images which are about to be displayed may be stored in a RAM or other rapidly

accessed memory for more rapid display. These images may be associated with a segment which has just been displayed and/or with a segment which is being displayed or is about to be displayed, for example. The use of linearly arranged segments is important because the movement of a medical instrument through an organ can only be linear for a medical procedure, as the medical instrument cannot make a sudden "jump" through an organ. Instead, the medical instrument must move through each portion of the organ in a linear sequence. By contrast, Jacobus only teaches the selection of images from a collection, and does not teach or suggest the use of any type of segmentation of the simulated organ. Jacobus certainly does not teach or suggest the use of linearly arranged segments for determining which images are to be rendered. The portion of Jacobus recited by the Examiner as teaching such segmentation is in fact only concerned with selecting images for display (col 5, lines 20-24 of Jacobus).

The only brief mention of a model in Jacobus is for determining the force feedback, in col 7, lines 1-13 and also for Figure 8. However, the taught model is not described as being three-dimensional, nor are any teachings provided for the use of such a model for rendering images. In addition, the taught model of Jacobus is not taught or described as being segmented in any way.

Third, as recited in dependent claims 3 and 4, and also as recited in new independent claim 44, the present invention teaches the use of texture mapping data to create new images for display to the user. These new images are not

merely retrieved from storage, but instead involve the combination of different types of visual data, including stored images and texture mapping data, which may include animation for example. By contrast, Jacobus only teaches the retrieval of images from a database, and does not teach or suggest the addition of actual texture data. Although the Examiner does not state any particular part of Jacobus as teaching such texture mapping, in fact the part of Jacobus which is concerned with displaying images only teaches selecting images for display (col 5, lines 20-24 of Jacobus).

With regard to the statement of the Examiner that the texture mapping data engine is taught by Jacobus, Figure 4, items 42, 46 and 54, Applicant respectfully asserts that this portion of Jacobus does not teach or suggest the texture mapping function of the present invention. The accompanying textual description, in col 5, lines 7-35, clearly states that the graphics overlay item (ref 54) merely adds images of the simulated endoscopic instrument to the selected, pre-recorded images. The graphics overlay does not add true texture mapping in order to generate an image *de novo*, as for the present invention. Thus, the present invention can be clearly distinguished from the teachings of Jacobus.

While continuing to traverse the rejections of the Examiner, in order to expedite the prosecution, Applicant has chosen to amend claim 1 and to add new independent claim 44. Amended claim 1 now recites a *three-dimensional* model; the word "three-dimensional" was added to clarify that the model of the organ actually models it in all dimensions, and also to differentiate such a model from the two-dimensional image structures taught by Jacobus, which do

not model the organ in any way. Furthermore, amended claim 1 now recites that the segments of the model are in a linear sequence; as stated above, Jacobus does not mention the importance of the use of any segments, and certainly does not teach or suggest the advantage of linearly arranged segments.

New independent claim 44 now emphasizes the importance of texture mapping for creating new images, which is not taught or suggested by Jacobus.

Support for these claims can be found throughout the specification. In particular, support for the three-dimensional mathematical model and the linear segments can be found in the application in Figure 3A and on page 4, lines 5-17, page 10, lines 14-end, and on page 15. Support for the texture mapping can be found in original claims 2-4.

Rejections over 35 USC 103(a)

The Examiner has rejected claims 7, 9, 10-17, and 21-26 under 35 USC 102(a) as being unpatentable over US Patent No. 5,769,640 to Jacobus et al. (Jacobus), in view of US Patent No. 5,956,040 to Asano et al., US Patent No. 5,882,206 to Gillio, and/or US Patent No. 5,767,839 to Rosenberg. The rejections of the Examiner are respectfully traversed. However, since these rejections are drawn to dependent claims, Applicant feels that these rejections have been overcome by the above arguments and amendments which support the base claim, claim 1.

From the above remarks and amendments, Applicant feels that claims 1-27 and 39-44 are now in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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Date: August 18, 2002

APPENDIX – marked-up claims

1. (Amended) A system for performing a simulated medical procedure, comprising:

(a) a simulated organ;

(b) a simulated instrument for performing the simulated medical procedure on said simulated organ;

(c) a locator for determining a location of said simulated instrument within said simulated organ; and

(d) a visual display for displaying images according to said location of said simulated instrument within said simulated organ for providing visual feedback, such that said images simulate actual visual data received during an actual medical procedure as performed on an actual subject, said visual display including:

(i) a three-dimensional mathematical model for modeling said simulated organ according to a corresponding actual organ, said model being divided into a plurality of segments, said plurality of segments being arranged in a linear sequence;

(ii) a loader for selecting at least one of said plurality of segments from said linear sequence for display, said at least one of said plurality of segments being selected according to said location of said simulated instrument within said simulated organ;

(iii) a controller for selecting a simulated image from said segment according to said location of said simulated instrument; and

(iv) a displayer for displaying said simulated image.

3. (Amended) The system of claim 2, wherein said texture mapping data [is] comprises animation of random movement of said simulated instrument and random movement of said simulated organ.

4. (Amended) The system of claim 1, wherein said texture mapping data includes images obtained from performing said actual medical procedure on said actual subject.